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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,437	01/05/2006	Takemori Takayama	2005_2071A	4545
513 7590 10/27/2010 WENDEROTH, LIND & PONACK, L.L.P. 1030 15th Street, N.W., Suite 400 East Washington, DC 20005-1503				
EXAMINER YEE, DEBORAH				
ART UNIT 1733		PAPER NUMBER		
NOTIFICATION DATE 10/27/2010		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/563,437

**Applicant(s)**

TAKAYAMA ET AL.

**Examiner**

Deborah Yee

**Art Unit**

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3, 15-26, 28-30 and 32-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 16, 18 to 26, 28 to 30, 32, 33 and 35 to 43 is/are rejected.
- 7) ☒ Claim(s) 15, 17 and 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 25, 2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 16, 18 to 26, 28 to 30, 32, 33 and 35 to 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 7,297,177 ("Sandberg") in view of English abstract of Japanese patent 08-109450 ("JP'450"), Japanese patent 363262402 ("JP'402") or Japanese patent 360050151 ("JP'151") and further in view of US Patent 5,328,772 ("Tanaka"), US Patent 5,675,201 ("Komura") or US Patent 3,424,503 ("Schulz").

4. Sandberg on lines 15-42 in column 2 discloses an abrasion resistant sliding sintered material having a tempered martensite microstructure with solid soluble carbon concentration of 0.3 -0.7% and preferably 0.4 – 0.6% (overlaps claimed solid soluble

carbon range of 0.15 to 0.5%) and contains carbide in a content of 6 to 13 vol. % carbides (overlaps claimed carbide range of 5 to 50 vol. %) which include vanadium-rich MC and  $M_7C_3$ -carbides.

5. In addition, sintered material of Sandberg has a composition containing alloying constituents whose wt% ranges overlap those recited by instant claims; and such overlap in wt% ranges establishes a prima facie case of obviousness because it would be obvious for one skilled in the art to select the claimed alloy wt% ranges over the broader disclosure of the prior art since the prior art on lines 9 to 45 of column 1 teaches the same utility as present invention to make wear resistant sliding member, see MPEP 2144.05 (I).

6. Sandberg does not teach recesses and/or closed pores at the sliding surface in an area ratio of 1 to 10% as recited one or more of the claims. Nevertheless, it is a well known in the metallurgical art to control pores and/or recesses at metal sliding surface in order that lubricant may pass through or can be impregnated to thereby improve wear or abrasion resistance as evidenced by English abstract of JP'450. Since improve wear resistance would be desired by Sandberg then it would be an obvious modification well within the skill of the artisan to control the recesses and/or closed pores of its sintered material in view of JP'450. Moreover, claimed recess/pore area ratio of 1 to 10% would be a matter of routine optimization well within the skill of the artisan to select depending on the desired level of lubrication required which is productive of no new and unexpected results.

7. Sandberg on lines 9 to 45 of column 1 teaches sintered alloy material is suitable for applications where adhesive wear and/or chipping are the dominating problem and require a protective surface which would include a sliding member with metal back such as connecting device, floating seal or thrust bearer as set forth in claims of present application.
8. In regard to Cu alloy, Mo, W and/or P powder recited in one or more instant claims, they are common additives for analogous wear resistant alloy to promote abrasion resistance in view of English abstract of JP'450, JP'402 or JP'151, and therefore would be obvious to incorporate to the Sandberg alloy.
9. In regard to structural limitations recited in one or more of the instant claims, they are standard and conventional for a thrust bearer or floating seal well known in the art and therefore would not be a patentable distinction. Note Schulz teaches a thrust bearing comprising a cylindrical member and a collar at one end with bushing fixedly mounted at an inner surface of cylindrical member, said bushing being made of porous sintered material which retains lubricant. In addition, Komura in figure 2A shows a thrust bearing body which incorporate air vents (101) and grooves (6) and Tanaka in table 1 of columns 7-8 teaches that a back metal hardness of at least HV 170 is standard and conventional for bearing application.
10. Prior art does not teach ferrous sintered sliding body having a claimed thickness of at least 0.5 mm but such thickness limitation would be a matter of routine optimization well within the skill of the artisan to select depending on its application and level of wear resistance required.

11. Claims 1, 3, 16, 18 to 26, 28 to 30, 32,33 and 35 to 43 are rejected under 35 U.S.C. 103 (a) as being unpatentable over US Patent 5,936,169 ("Pinnow") in view of English abstract of Japanese patents 08-109450 ("JP'450"), Japanese patent 363262402 ("JP'402") or Japanese patent 360050151("JP'151") and further in view of US Patent 5,328,772 ("Tanaka"), US Patent 5,675,201 ("Komura") or US Patent 3,424,503 ("Schulz").

12. Pinnow in claims 1 to 16 in columns 20-24 teach an wear resistant sintered iron alloy material composition having alloying constituents whose wt% ranges overlap those recited by instant claims; and such overlap in wt% ranges establishes a prima facie case of obviousness because it would be obvious for one skilled in the art to select the claimed alloy wt% ranges over the broader disclosure of the prior art since the prior art on lines 35-50 in column 20 teaches the same utility as present invention to make an abrasion resistant sliding bearing, see MPEP 2144.05(I).

13. In addition, the alloy of Pinnow exhibits a tempered martensitic microstructure containing uniformly distributed carbides comprising  $\text{Cr}_7\text{C}_3$  and VC carbides in the range of 16 to 36 vol. % and is within the claimed range of 5 to 50 vol. % recited by instant claim 1.

14. Pinnow does not teach solid soluble carbon of 0.15 to 0.5% but such characteristic would be expected since its composition and process of making by sintering, solution heat treating and tempering closely meet the instant claims and in absence of evidence to the contrary. Note for example, Heat No. L517 in table III of columns 9-10 has a sintered material composition comprising 2.25%C – 13.57%Cr –

8.9%V – 1.03% Mo - 0.098 N - Fe balance and exhibits 13.5 vol. %  $M_7Cr_3$  and 9.5 vol. % VC which meets the claimed composition and carbide limitation. In addition, alloy is made in substantially the same manner as Applicant on lines 4 to 12 on page 71 of instant specification comprising the steps of vacuum sintering, solution heat treating by austenitizing at 2050°F (1121°C), quenching to form martensite and tempering between 500°F to 600°F (260°C-315.5°C), see Pinnow on lines 25- 43 of column 7 and lines 20 to 37 of column 9

15. Pinnow does not teach recesses and/or closed pores at the sliding surface in an area ratio of 1 to 10% as recited one or more of the claims. Nevertheless, it is well known in the metallurgical art to control pores and/or recesses at metal sliding surface in order that lubricant may pass through or can be impregnated to thereby improve wear or abrasion resistance as evidenced by English abstract of JP'450. Since improve wear resistance would be desired by Pinnow then it would be an obvious modification well within the skill of the artisan to control the recesses and/or closed pores of its sintered material in view of JP'450. Moreover, claimed recess/pore area ratio of 1 to 10% would be a matter of routine optimization well within the skill of the artisan to determine depending on the level of lubrication required which is productive of no new and unexpected results.

16. In regard to Cu alloy, Mo, W and/or P powder recited by one or more instant claims, they are common additives for analogous wear resistant alloy to promote abrasion resistance in view of English abstract of JP'450, JP'402 or JP'151, and therefore would be obvious for one skilled in the art to incorporate to the Pinnow alloy.

17. In regard to structural limitations recited by one or more of the instant claims, they are standard and conventional for a thrust bearer or floating seal known in the art and would not be a patentable distinction. Note Schulz teaches a thrust bearing comprising a cylindrical member and a collar at one end with bushing fixedly mounted at an inner surface of cylindrical member, said bushing being made of porous sintered material which retains lubricant. In addition, Komura in figure 2A shows a thrust bearing body which incorporate air vents (101) and grooves (6) and Tanaka in table 1 of columns 7-8 teaches that a back metal hardness of at least HV 170 is standard and conventional for bearing application.

18. Prior art does not teach ferrous sintered sliding body having a thickness of at least 0.5 mm but such thickness limitation would be a matter of routine optimization well within the skill of the artisan to select depending on its application and level of wear resistance required.

### ***Response to Arguments***

19. Applicant's arguments filed August 25, 2010 have been fully considered but they are not persuasive over the rejection to US Patent 5,936,169 to Pinnow in view of secondary teaching as set forth in Office action dated March 1, 2010.

20. It was argued that Pinnow does not teach a ferrous sintered material containing "solid soluble carbon of 0.15 to 0.5 wt%" as recited in claim 1 of present application; and such characteristic would not be inherent or expected in accordance with MPEP 2112.01 because "solid soluble carbon" is not a property but rather a chemical composition.



21. It is the Examiner's position that "solid soluble carbon" is a by-product of its chemical composition and its process of making. Note that Pinnow in table III of columns 9-10 disclose examples that meet the composition and carbide limitations of instant claims and are processed in substantially the same manner as present invention such that a portion of carbon forms carbides and a portion would inherently be in solid solution. For example, Heat No. L517 in table III of columns 9-10 has a sintered material composition comprising 2.25%C – 13.57%Cr – 8.9%V – 1.03% Mo - 0.098 N - Fe balance and exhibits 13.5 vol. %  $M_7Cr_3$  and 9.5 vol. % VC which meets the claimed composition and carbide limitation. In addition, alloy is made in substantially the same manner as Applicant on lines 4 to 12 on page 71 of instant specification comprising the steps of vacuum sintering, solution heat treating by austenitizing at 2050°F (1121°C), quenching to form martensite and tempering between 500°F to 600°F (260°C-315.5°C), see Pinnow on lines 25- 43 of column 7 and lines 20 to 37 of column 9

22. Applicant's arguments, with respect to the rejections over Japanese patent 0213844, WO/2002/070759 and Reference AO have been fully considered and are persuasive. Instant claims differ for the following reasons:

1) JP'844 does not teach a solid soluble carbon concentration of 0.15 to 0.5 wt% and such by-product would not be expected since process of making is different from present invention. JP'844 teaches sintering but does not teach solution heat treating by austenitizing and quenching.

2) WO'759 teaches ferrous alloy material produced by thermal spraying whereas Applicant's claims recite a sintered sliding member produced by sintering.

Consequently alloy of WO'759 made by thermal spraying has a different microstructure compared to present invention alloy made by sintering.

3) Reference AO in view of its English disclosure does not teach a ferrous alloy having martensite whereas instant claims actively recite a martensite phase. Therefore rejections have been withdrawn.

***Allowable Subject Matter***

23. Claims 15, 17 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

24. Claims 17 and 34 recite a sintered sliding member wherein martensite phase contains retained austenite phase dispersed therein in a content of 5 to 40% by volume which is not taught or suggested by the art of record.

25. Claim 15 recites a sintered sliding member composition wherein at least one carbide selected from the group consisting of  $\text{Cr}_7\text{C}_3$  carbide,  $\text{M}_6\text{C}$  carbide and  $\text{MC}$  carbide being coarsened to have an average grain size of at least  $40\text{ }\mu\text{m}$ , dispersed and precipitated therein in a content of at least 3% by volume by adding Cr powder, Mo powder, W powder, V powder or ferrous alloy contained high alloying elements which is not taught or suggested by the art of record. In particular, US Patent 7,297,177 to Sandberg et al. teaches carbide diameter of  $< 3\text{ }\mu\text{m}$  and US Patent 5,936,169 to Pinnow et al. teaches a carbide diameter of up to  $6\text{ }\mu\text{m}$ .

26. Also to distinguish other claims over applied prior art, it is recommended to actively recite Cr of at least 9 wt% and Mo of at least 3.5% in all independent claims.

Note in comparison, Sandberg teaches 2.5 to 4.5% Cr and Pinnow teaches up 3.0% Mo. Support for proposed amendment is shown in claim 3.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deborah Yee whose telephone number is 571-272-1253. The examiner can normally be reached on monday-friday 6:00 am-2:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Deborah Yee/  
Primary Examiner  
Art Unit 1733

/DY/